

CLAIMS

I claim:

1. A transmission line element formed in an integrated circuit chip comprising:

5 a plurality of metal layers, each of said metal layers being separated from an adjacent metal layer by at least one dielectric layer;

a first conductor comprising at least two transmission lines in different metal layers;

10 a second conductor comprising at least two transmission lines in different metal layers, the transmission lines in said first and second conductors running parallel to each other;

15 a plurality of interconnects located at predetermined positions along said conductors, each of said interconnects containing an electrical connection between the transmission lines in said first conductor and an electrical connection between the transmission lines in said second conductor;

wherein at least one transmission line in said first conductor is edge-coupled to at least one transmission line in said second conductor and broadside-coupled to at least one other transmission line in said second conductor.

20 2. The transmission line element of Claim 1 wherein at least a second transmission line in said first conductor is edge-coupled to at least one transmission line in said second conductor and broadside-coupled to at least one other transmission line in said second conductor.

25 3. The transmission line element of Claim 1 wherein at least one of said interconnects comprises a via through said at least one dielectric layer, a first tongue extending from one of said transmission lines and a second tongue extending from another one of said transmission lines.

30 4. The transmission line element of Claim 1 wherein said first conductor comprises two transmission lines and said second conductor comprises two transmission lines.

5. The transmission line element of Claim 1 wherein said first conductor comprises three transmission lines and said second conductor comprises three transmission lines.

6. The transmission line element of Claim 5 comprising three metal layers,
5 each of said metal layers comprising two transmission lines.

7. The transmission line element of Claim 5 comprising two metal layers, each of said metal layers comprising three transmission lines.

8. The transmission line element of Claim 1 comprising a third conductor.

9. The transmission line element of Claim 6 wherein each of said first,
10 second and third conductors comprises three transmission lines.

10. The transmission line element of Claim 1 wherein said first and second conductors are in the shape of a spiral.

11. A transmission line element formed in an integrated circuit chip comprising:

15 at least a first metal layer and a second metal layer, said first and second metal layers being separated by a first dielectric layer;

at least a first transmission line and a second transmission line formed in said first metal layer;

20 at least a third transmission line and a fourth transmission line formed in said second metal layer, said third transmission line lying below said first transmission line, said fourth transmission line lying below said second transmission line, said first, second, third and fourth transmission lines extending parallel to each other;

25 a plurality of interconnects located at predetermined positions along said transmission lines, each interconnect comprising a first electrical connection between said first and fourth transmission lines and a second electrical connection between said second and third transmission lines.

12. The transmission line element of Claim 11 wherein said first electrical connection comprises:

a first via extending through said dielectric layer;
a first tongue extending from said first transmission line to said first via;
and
a second tongue extending from said fourth transmission line to said first
5 via.

13. The transmission line element of Claim 12 wherein said second
electrical connection comprises:

a second via extending through said dielectric layer;
a third tongue extending from said second transmission line to said
10 second via; and
a fourth tongue extending from said third transmission line to said
second via.